MISFIBE CAUSES IN BLASTING EXPLAINED

(Continued from Page One)

beyond the blocks in the direction of the fire. The flash was more vigorous than in the case of loose fuse.

8. A piece of fuse was strongly gripped in a vise as in No. 7, but between an iron block on one side and a piece of hard belting-leather on the other. The flash was vigorous as in No. 7.

9. Two pieces of fuse were gripthelrped as in No. 8, but the end of the fuse was flush with edge of blocks, so that none protruded. The flash was very weak—not over ⅛ or ¼ in. beyond end of fuse.

20. Several pieces of fuse were gripped firmly at their extreme ends in jaws of California crimpers, and lanted at the other end. The flash was noticeably weaker than when burned without pressure. When the end of the fuse was crushed twice on opposite sides with the edges of the crimping surface of the crimpers and then held firmly in the crimpers, the flash was extremely weak, only a few sparks getting through, and these being feeble.

11. Several pieces of fuse were gripped strongly in crimpers so that ½ in. of fuse protruded. The flash was strong.

12. A piece of cold glass was held ½ in. from the end of the burning fuse. When the flash occurred, a considerable quantity of moisture was condensed on the glass.

Experiments With Caps.

All caps, with the exception noted, were No. 8 made by the California Cap Co. All were crimped with a California crimper.

13. Number tested, 20; fuse cut square; end of fuse placed in loose contact with fulminate; crimped with one moderate pressure at end of cap. All exploded.

14. Number tested, 20; fuse cut square; end of fuse in loose contact with fulminate; crimped hard two widths of crimper, revolved quarter turn and crimped again. All exploded.

15. Number tested, 20; fuse cut square; end of fuse in contact with fulminate; crimped hard with edges of crimper so as to bruise fuse, and then crimped hard in the regular way for two widths of crimper; cap had battered appearance. All exploded.

16. Number tested, 20; fuse cut square; end of fuse ¼ in. from fulminate; crimped with one moderate pressure at end of cap. All exploded.

17. Number tested, 20; fuse cut square; end of fuse ¼ in. from fulminate; crimped hard with pressure two widths of crimper, so that crimping extended to tip of fuse, revolved half over and crimped again. None exposed fire.

18. Number tested, 20; fuse cut square; end of fuse ⅛in. from fulminate; crimped with one moderate pressure at end of cap. All exploded.

19. Number tested, 20; fuse cut with long slant and pushed firmly against fulminate; crimped with one moderate pressure at end of cap. All exploded.

20. Number tested, 20; fuse cut square; end of fuse in contact with fulminate; crimped with fuse cutters, making deeply indented groove around cap. All exploded.

21. Three caps with end of fuse ⅛in. from fulminate were placed in snow and left several minutes before splitting. All exploded.

22. No. 5 caps, number tested, 50; fuse cut square and placed in loose contact with fulminate; crimped with one moderate pressure at end of cap. All exploded.

The result of these tests point definitely to the squeezing and crushing of the extreme end of the fuse inside the cap as certain to cause misfires. Experiments 1 to 5 showed nothing wrong with the fuse, although they were not conducted on a large enough scale to be considered an adequate test where a large quantity of fuse is under consideration.

Experiment 6 showed that pressure did not affect the rate of burning to any appreciable extent, and did not extinguish the fuse. The explosion at the point where the fuse left the vise is explained as the result of the constriction in the bore of the fuse. The powder train, while burning between the vise-jaws, was compelled to do so under an unusual pressure from the resulting gases, in order to force them through the constricted opening; and this pressure was sufficient to rupture the walls of the fuse as soon as it was unsupported by the vise. In No. 7 and 8 this pressure exerted itself in forcing the fire through the remaining half inch of fuse, and thereby increased the strength of the flash. Experiments 9 and 10 showed that the explosive force of the burning powder was greately decreased when the fuse was under pressure, although as seen in No. 8, the rate of burning was not affected. When the fuse was under pressure to its extreme end, and the the flash was very weak. Experiments 7, 8, and 11 showed that ⅛ in. of uncompressed fuse lying beyond the area of pressure was sufficient to insure a strong flash.

Of the experiments with caps, No. 13, 14, 15, 20, and 22 showed perfect results in all cases where the end of the fuse was cut square and placed in loose contact with the fulminate, even when the crimping was unnecessarily severe. It is noteworthy that no experiment was made with the fuse in contact with the fulminate and the cap crimped to the tip of the fuse, as this would have involved danger of accidental explosion of the fulminate in the crimping process.

No. 16 and 18 gave perfect results with the end of the fuse ¼ and ½ in. from the fulminate, although it is conceivable that with weak fuse misfires might occur from this practice if it were followed regularly.

No. 117, considered in connection with No. 9 and 10, indicates the possibility of misfires that can easily occur in practice, and one that would hardly be suspected without a special investigation. The experiments show that pressure at the tip of the fuse, especially if it be applied several times and from different directions so as to roll or crush the fuse, will disarrange the powder train, decidedly weaken the flash, to such an extent that when the end of the fuse was ⅛ in. from the fulminate it caused nine misfires out of 20. In contrast to this, with moderate crimping, all of 20 trials were successful when the end of the fuse was ⅛ in. from the fulminate. The incident of careless crimping that I mentioned, with its four misfires out of 18 loaded holes, was doubtless of this nature, and was due to crushing and crimping the fuse at its tip, as shown by an investigation of the single cap recovered after soaking it in water. Consideration of caution prevented me from carrying my investigation to the extent that my ex-employee did.

Experiment 19 failed to produce any misfires, although the practice of cutting the fuse with a long slant is commonly regarded as a cause of misfires, and cannot be recommended. The experiment was made in cold weather. Probably if the fuse were warm, the slanting end would show a greater tendency to curl over when pressed against the fulminate and thus prevent the flash from striking the fulminate. It is also probable that the chance of misfires from hard crimping would be increased with warm fuse, because it would then be softer and more easily crushed.

Experiment 21 was made to test the possibility of misfire being caused by the condensation of moisture in the flash (experiment 12) on the cold fulminate, so as to prevent its explosion, but the result was negative.

I realize that to make experiments of this kind conclusive as to the proportion of misfires caused by the different methods of attaching the cap to the fuse, it would be necessary greately to increase the number of tests, but, as I started before, my object was rather to test the conclusions formed by observations made under working conditions, and incidentally to learn anything else that might come up, and the number of trials were sufficient for this purpose. As I hoped, the shooting up the case with which misfires could be caused by a slight variation from the commonly approved method of attaching fuse and cap.

Summary of Conclusions.

To summarize my conclusions, I would make the following recommendations:

1. Cut the fuse square, with an instrument that does not mash the end, such as a sharp knife, a pair of sheep shears, or, best of all, a broad thin, sharp chisel used with a mallet.

2. Insert the fuse into the cap until the end is in loose contact with the fulminate.

3. Use the California crimper (broad type) giving the cap one firm squeeze close to the open end. If smoking where there is water in the holes, protect the cap from dampness by applying grease or tar.

4. Particularly avoid crimping the cap over the lip of the fuse. Always leave ¼ to ½ in. of uncrimped fuse at the end.

5. If possible, have one reliable man trained to prepare all the fuse for the mine (according to size of the mine.)

Previous to making this investigation I had been bothered with an undue number of misfires in the mine. Each miner had been allowed to prepare his own fuse and caps, but on adopting the system of having all the fuse and cap prepared by one man the misfires were almost eliminated.

EARLY DAY MAN NOW VISITING IN ARIZONA

R. Pumpelly, Resident of Tucson Before the Civil War, Tells of Exciting Times Had In Territory

TUCSON, March 13.—Tucson was a little cluster of Mexican adobe huts and the American population consisted of mostly fugitives from San Francisco and California, who had been driven out by the activities of the vilignance committee when I first saw this place before the outbreak of the civil war," said R. Pumpelly at the Santa Rita hotel, this morning. Mr. Pumpelly, accompanied by his son, Raphael, arrived from the east Saturday night and will spend another day or so here.

He came to Arizona first before the outbreak of the civil war and was mining engineer at the Old Santa Rita mine, south of here and east of Tubac. His stories of the early days are most interesting and give a graphic idea of the hardships those real Arizona pioneers went through. Mr. Pumpelly still has mining interests in Arizona, being interested at Miami.

many escaped Australian convicts in that part of the west and a large population of cut-throat Mexicans. There was a revolution in Mexico as there is now and there was fighting in Sonora. One of the revolutionary leaders was in hiding on the United States side of the line.

When Mr. Pumpelly first came to Arizona the Indians were not bad and did not molest the white people. They would steal horses and cattle and now and then kill a Mexican, but they showed no outright hostility toward Americans.

The story of how the Apaches came to take the warpath and to make southern Arizona a very hell for the white settlers as told by Mr. Pumpelly is different in many respects from the comonly accepted version of the Apache outbreak.

Mr. Pumpelly said that the trouble started over the stealing of a boy and a cow, both belonging to a Mexican woman who was living with an American. This American reported the affair to Col. Morrison who was at Fort Buchanan, which was on the upper Senorita. The commanding officer of the troops ordered Lieut. Bascom to proceed after the Indians with the 7th Infantry.

Cochise Parleys.

Three tribes of Apaches were at Dragoon pass and Bascom and his command arched there. Under a flag of truce and six chiefs, whose whom was Cochise, came to the soldiers camp to hold a parley with the soldiers. They were taken into a tent and it is understood that they denied any knowledge of the kidnapping of the child or the stealing of the Mexican woman's cow. There was a quarrel between the military officers and the Indians and Lieut. Bascom ordered the Apaches seized and bound. Cochise understanding what was to happen grabbed up a knife and slashed his way through the tend and ran toward the Indian camp. The sentry fired on him, as did some of the other soldiers, and before reaching his friends Cochise was struck by three bullets.

In sight of the Indian camp the five chiefs who had been seized by Lieut. Bascom were hung. To get even, the Indians brought forward 12 Mexican captives they were holding and strung them up head down in sight of the soldiers. Bascom ordered his company in charge the Indians and a rush was made at the hill. The Apaches repulsed the attack and Bascom was forced to retreat back to the fort.

As soon as these soldiers reached their barracks, they were ordered to pack for the march east to take part in the civil war which was just then breaking out. All the regulars in Arizona were withdrawn by the federal government and then the Indians went wild and began a campaign of killing and butchery of the whites.

Mr. Pumpelly narrowly escaped being killed and one of the men at the mine was killed.

Reign of Terror.

Acng with the Indian horrors, the lawless white population aided by the renegade Mexicans began a reign of terror. No such thing as civil law existed. It was each man for himself and killing was every day occurrences with no law to prevent. Sometimes a man who was not particularly popular would dosep a man who had friends and the killer would be started for Albuquerque, where there was supposed to be some kind of a government. The escorting parties would generally return within a short time and the body of the killer would be found later hanging to a tree. All the law there was in this part of Arizona in those days, says Mr. Pumpelly, was what was in the conscience of the citizens. There was no other restraint.

Taking advantage of the lawless situation, the Mexicans became unruly and killed many Americans. They killed all the white men at the San Pedro mining camp and in their raids on ranches were nearly as bad as the Cerro Colorado camp, Col. Poston's mine. Conditions became so bad that finally there were only six or eight respectable white men left in southern Arizona.

Mr. Pumpelly and some of his friends decided that there was no use of trying to do anything in the way of mining in southern Arizona, and they planned to get out of the country. They escaped by going down into Sonora and taking the Caborca to Gila City trail. They crossed the Colorado at Yuma in a ferry run by a Mr. Iaeger, who was the father of Louis Iaeger, of the Santa Rita hotel. After crossing the river they made their way through the desert over that part of the country now known

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ANACONDA WORKS REDUCTION CHANGES

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ft. of free air per minute. This blower is direct connected to steam turbine and runs at about 3,400 r.p.m. It is now in operation and has proved highly successful. The blast furnace and the briquetting plants will, under the new system, be no longer required, but will be kept intact and in good repair, so that they may be used in emergencies or at times when the price of copper is high and it may be advisable to push the copper output beyond the maximum capacity of the other departments.

The improvements at Anaconda will cost about $4,000,000. At Great Falls about $1,750,000 will be spent. A new refinery is being constructed at Great Falls which will have a capacity of 10,000,000 lb. of copper per month. It will replace the old refinery which has been in operation a great many years and which is no longer economical. The new plant will, however, have twice the capacity of the old plant. The refinery will be kept in operation, partly or entirely, on copper shipped from Anaconda, depending on whether or not the Great Falls smelter is in operation. The new smelter at Great Falls will be completed and the pulverized coal system, which has proved so successful at Anaconda, will be applied to the Great Falls furnace. Coal from the Lochray coalfields is to be burned. The ash content of this coal is high, but this has not proved detrimental, both the output per furnace and the tonnage smelted per ton of coal will be greately increased over the old system of gas firing. No concentration of ore will come to Anaconda and concentrate only will be shipped from there. The blast-furnace department at Great Falls will also be closed, and all smelting will be done in reverberatories, as at Anaconda.

The new leaching plant at Anaconda, which will be operated on tailing that has accumulated during the past years to such an extent that about 15,000,000 tons is available for re-treatment, is nearing completion and will probably be started early in April. It will treat from 2,00 to 2,500 tons per day of tailing containing from 12 to 14 lb. of copper per ton and will make from 600,000 to 700,000 lb. of copper per month at low cost. The supply of tailing for this plant is sufficitne to keep it in operation for a period of about twenty years.

The new acid plant is also nearing completion and will be able to make somewhat over 100 tons of acid per day. This acid will be used in the leaching plant and in the new flotation plants.

The company has much experimental work underway along various lines, which may be in the course of a few years lead to the establishment of other important lines of industry at Anaconda and other points.

CHILDREN HATE OIL, CALOMEL AND PILLS

"California Syrup of Figs" best for tender stomach, liver, bowels —tastes delicious.

Look back at your childhood days. Remember the "dose" mother insisted on—castor oil, calomel, cathartics. How you hated them, how you fought against taking them.

With your children it's different. Mothers who cling to the old form of physic simply don't realize what they do. The children's revolt is well-founded. Their tender little "insides" are injured by them.

If your child's stomach, liver and bowels need cleansing, give only delicious "California Syrup of Figs." Its action is positive, but gentle. Millions of mothers keep this harmless "fruit laxative" handy; they know children love to take it; that it never fails to clean the liver an bowels and sweeten the stomach, and that a teaspoonful given today saves a sick child tomorrow.

Ask your druggist for 50-cent bottle of "California Syrup of Figs," which has full directions for babies, children of all ages and for grown-ups plainly on each bottle. Beware of counterfeits sold here. See that it is made by "California Fig Syrup Company." Refuse any other kind with contempt. —Adv.

New Cornelia Attracts Much Attention Here

(Continued from page 1)

cressing and it is very apparent that those in possession of the stock feel they have a feature which they are not willing to part with.

GENERAL SHARE OUTLOOK

The situation for copper metal and copper securities today is stronger than at any time in the last year or more, and is growing stronger hourly. The large producers have stepped up production very markedly, but the increase in output is still far below the demand for the red metal.

The price of electrolytic copper holds firmly around 14 3-4c asked in New York and at 15c in London with the bulk of the sales netting 14.6c f. o. b. New York. This price mark has been unobtained for over a month now and the increase in production has failed to weaken it.

The leading producers of the United States are now on a producing basis of 66 2-3 per cent capacity, compared with 50 per cent operations in rosue up to within the past month.

The other operating companies are at 75 per cent to full capacity. The copper producing industry today, taken as a whole, is operating at 70 to 75 per cent of capacity, producing between 105,000,000 and 110,000,000 pounds of copper per month.

Production is 15,000,000 to 20,000,000 pounds below the demand.

In the short February month domestic consumers alone pulaced orders for more than 70,000,000 pounds of copper, it is reported. Shipments to Europe are now at the rate of over 55,000,000 pounds monthly, making a total domestic and foreign demand of over 125,000,000 pounds per month.

A further rise in the price of copper metal is imminent.

The strong situation in copper and the coppers was reflected by an advance in the dividend-paying copper securities on the New York Stock Exchange. Miami, Utah, Smelters, Ammalgamated, Anaconda, Chino, Ray and Nevada Consolidated all showed strength.